

**WHAT IS CLAIMED IS:**

- 1                   1. A method for registration of first and second images out of  
2 registration, the method comprising the steps of:
  - 3                   (a) making the edges in the first and second images more prominent;
  - 4                   (b) thresholding the first and second images from the previous step  
5 using a threshold for which N percent of the pixels of each of the first and second  
6 images are over the threshold;
  - 7                   (c) reducing the resolution of the first and second images from the  
8 previous step; and
  - 9                   (d) registering the first and second images of reduced resolution from  
10 the previous step.
- 1                   2. The method of claim 1, further comprising the step of blurring the  
2 first and second images from the thresholding step.
- 1                   3. The method of claim 2, wherein the blurring step comprises filtering  
2 each of the first and second images from the thresholding step such that each pixel  
3 therein is thickened by a predetermined number of pixels in a square array that extends  
4 the predetermined number of pixels in all four directions from a central pixel.
- 1                   4. The method of claim 1, further comprising the step of increasing the  
2 resolution of the registered first and second images from the registering step.
- 1                   5. The method of claim 1, wherein step (a) comprises filtering the first  
2 and second images with an edge-enhancement filter.
- 1                   6. The method of claim 1, wherein N, the percentage of pixels of each  
2 of the first and second images which are over the threshold is in the range of 70-80  
3 percent.

1                   7. The method of claim 6, wherein N, the percentage of pixels of each  
2 of the first and second images which are over the threshold is 80 percent.

1                   8. The method of claim 1, wherein step (b) further comprises choosing  
2 N automatically by computing a histogram of pixel intensities and setting the  
3 threshold for which N percent are over the threshold for a predetermined value of N.

1                   9. The method of claim 1, wherein step (c) comprises reducing the  
2 resolution of each of the first and second images from the previous step by a factor  
3 used to partition each of the first and second images from the previous step into square  
4 blocks of pixels and replacing each square with the sum of the pixel values.

1                   10. The method of claim 1, wherein step (d) comprises using a  
2 normalized correlation as a criteria for registering the first and second images from the  
3 previous step.

1                   11. The method of claim 1, wherein the registering of step (d) is done  
2 using a Fourier technique.

1                   12. A program storage device readable by machine, tangibly  
2 embodying a program of instructions executable by machine to perform method steps  
3 for registration of first and second images out of registration, the method comprising  
4 the steps of:

5                   (a) making the edges in the first and second images more prominent;

6                   (b) thresholding the first and second images from the previous step  
7 using a threshold for which N percent of the pixels of each of the first and second  
8 images are over the threshold;

9 (c) reducing the resolution of the first and second images from the  
10 previous step; and

(d) registering the first and second images of reduced resolution from the previous step.

1                    13. The program storage device of claim 12, further comprising the  
2 step of blurring the first and second images from the thresholding step.

1                   14. The program storage device of claim 13, wherein the blurring step  
2 comprises filtering each of the first and second images from the thresholding step such  
3 that each pixel therein is thickened by a predetermined number of pixels in a square  
4 array that extends the predetermined number of pixels in all four directions from a  
5 central pixel.

1                   15. The program storage device of claim 12, further comprising the  
2 step of increasing the resolution of the registered first and second images from the  
3 registering step.

1                   16. The program storage device of claim 12, wherein step (a)  
2 comprises filtering the first and second images with an edge-enhancement filter.

1                   17. The program storage device of claim 12, wherein N, the percentage  
2       of pixels of each of the first and second images which are over the threshold is in the  
3       range of 70-80 percent.

1                   18. The program storage device of claim 17, wherein N, the percentage  
2       of pixels of each of the first and second images which are over the threshold is 80  
3       percent.

1                   19. The program storage device of claim 12, wherein step (b) further  
2 comprises choosing N automatically by computing a histogram of pixel intensities and  
3 setting the threshold for which N percent are over the threshold for a predetermined  
4 value of N.

1                   20. The program storage device of claim 12, wherein step (c)  
2 comprises reducing the resolution of each of the first and second images from the  
3 previous step by a factor used to partition each of the first and second images from the  
4 previous step into square blocks of pixels and replacing each square with the sum of  
5 the pixel values.

1                   21. The program storage device of claim 12, wherein step (d)  
2 comprises using a normalized correlation as a criteria for registering the first and  
3 second images from the previous step.

1                   22. The program storage device of claim 12, wherein the registering of  
2 step (d) is done using a Fourier technique.

1                   23. A computer program product embodied in a computer-readable  
2 medium for implementing registration of first and second images out of registration,  
3 the computer program product comprising:

4                   (a) computer readable code means for making the edges in the first and  
5 second images more prominent;

6                   (b) computer readable code means for thresholding the first and second  
7 images from the previous step using a threshold for which N percent of the pixels of  
8 each of the first and second images are over the threshold;

9                   (c) computer readable code means for reducing the resolution of the  
10 first and second images from the previous step; and

(d) computer readable code means for registering the first and second images of reduced resolution from the previous step.

1                   24. The computer program product of claim 23, further comprising  
2 computer readable code means for blurring the first and second images from the  
3 thresholding.

1                    25. The computer program product of claim 23, further comprising  
2 computer readable code means for increasing the resolution of the registered first and  
3 second images from the registering.

1                    26. The computer program product of claim 1, wherein (b) further  
2                    comprises computer readable code means for choosing N automatically by computing  
3                    a histogram of pixel intensities and setting the threshold for which N percent are over  
4                    the threshold for a predetermined value of N.

1                    27. The computer program product of claim 1, wherein (c) comprises  
2 computer readable code means for reducing the resolution of each of the first and  
3 second images from the previous step by a factor used to partition each of the first and  
4 second images from the previous step into square blocks of pixels and replacing each  
5 square with the sum of the pixel values.

1                   28. The computer program product of claim 1, wherein (d) comprises  
2 computer readable code means for using a normalized correlation as a criteria for  
3 registering the first and second images from the previous step.